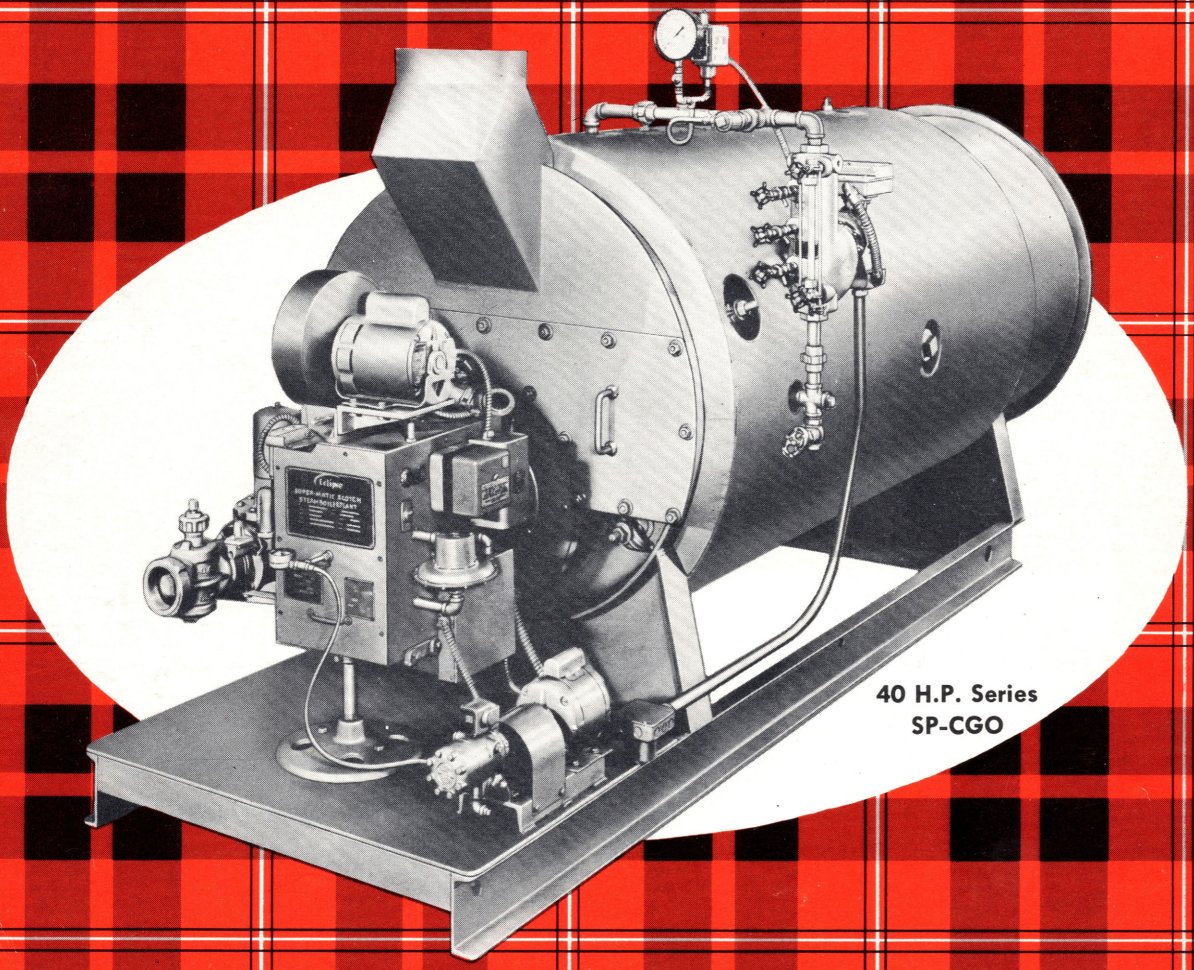
BULLETIN No. A-104

ECLIPSE SUPER-MATIC® SCOTCH "Steamboilerplants"



40 H.P. Series
SP-CGO

SELF-CONTAINED, FULLY AUTOMATIC, ASSEMBLED

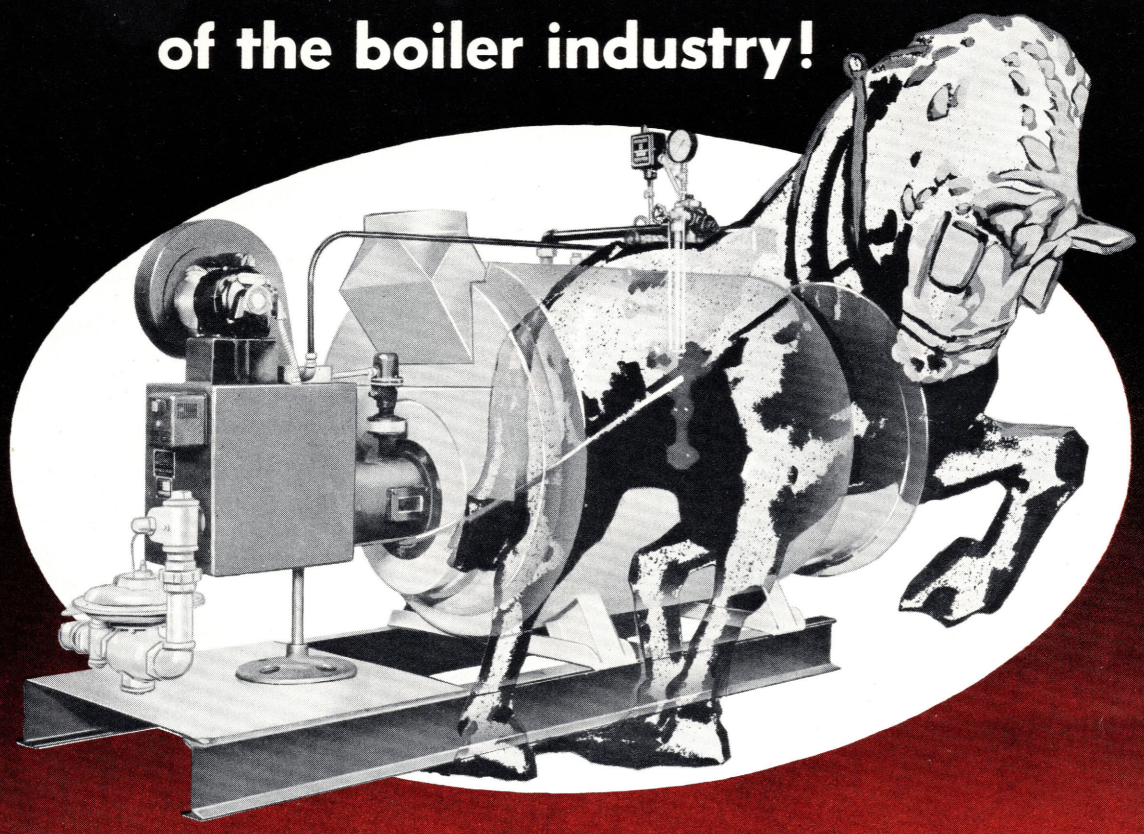
READY TO PRODUCE HOT, DRY STEAM FAST

Eclipse®

ECLIPSE FUEL ENGINEERING CO., ROCKFORD, ILLINOIS, U. S. A.

ECLIPSE FUEL ENGINEERING CO. OF CANADA, LTD., TORONTO, ONTARIO

WORKHORSE
of the boiler industry!



Packaged, *yes* . . . but we haven't forgotten the fundamentals!

Water still evaporates to steam by absorbing energy in the form of heat. Efficiency and capacity of boilers still depend on fundamental requirements of ample heating surface, large combustion space, plus plenty of water storage and steam space.

In the "packaged" boiler field, the Eclipse Super-Matic is outstanding for its *strict adherence* to these basic design principles. It's a packaged automatic steamboilerplant, ready to hook up and produce hot, dry steam *fast. Yet* it's a real Scotch-Marine . . . the finest design yet developed in the small boiler field.

None of the original steam-making fundamentals have been slighted . . . there's no skimping for fancy streamlining. Design is purely functional. It produces rated capacity (or better) without "pushing" or strain. Gives you a lifetime of service without costly maintenance. That's why it's known as the WORKHORSE of the boiler industry!

TYPICAL THERMAL EFFICIENCY TEST DATA

Total fuel burned	721.25 lbs. (weighed)
Steam pressure (average)	90.5 psi gage
Steam temperature (average)	331° F
Stack temperature (average)	498.0° F
Ambient temperature (average)	45.2° F
Oil temperature (average)	53.5° F
Draft-furnace outlet	.04 inches water
Flue gas analysis—CO_2	15.23 volume
O_2	.58 volume
CO	.00 volume
Total input (721.25# of oil having 18494 BTU per pound)	13,338,797 BTU
Less: 7% moisture loss	933,715 BTU
2.8% loss due to heat in dry flue gas (% at 331° = 5%. % at 498° = 7.8)	373,486 BTU
radiation loss of 5%, without insulation	666,939 BTU
Total Output	11,364,657 BTU

Total useful BTU ÷ Total BTU input = *85.2%* THERMAL EFFICIENCY

Eclipse Combination Gas-Oil Burner

Stack Connection

300% Greater Combustion Space

Large Steam Area

Greater Heating Surface

Refractory Lined Rear Chamber

1½" or 2" Dia. Return Tubes

Large Enclosed Furnace

Rigid Steel Foundation

Eclipse Super-Matic Scotch Steamboilerplant 11 sizes, from 12 to 125 h.p.

WORKHORSE steam space . . . hotter, drier steam

Large boiler shell, with low water line provides large steam storage area. Result is steadier water line, drier, hotter steam.

Most steam "generators" have small boiler drum . . . limited steam space.

Large Super-Matic drum . . . low water line . . . large steam space.

WORKHORSE combustion area . . . more heat output

Large internal furnace, with 300% more combustion volume, permits high heat output without strain or danger of heat cracks. Provides maximum conduction, convection and radiation of heat to surrounding water. All heating surfaces are below water line, protecting tubes from burning.

Small boiler drum of ordinary steam generator limits combustion volume . . . requires high BTU per cubic foot . . . intense heat strains metal.

Large Super-Matic furnace permits lower BTU per cubic foot . . . eliminates strain.

WORKHORSE water storage . . . constant horsepower output

Large water capacity of Eclipse Super-Matic gives you an "accumulator action." Greater reserve capacity eliminates fluctuations in steam pressure . . . peak loads are easily and quickly met.

Small water mass of most generators reduces reserve capacity . . . produces wet steam.

Large water capacity of Super-Matic increases reserve capacity . . . produces hot, dry steam.

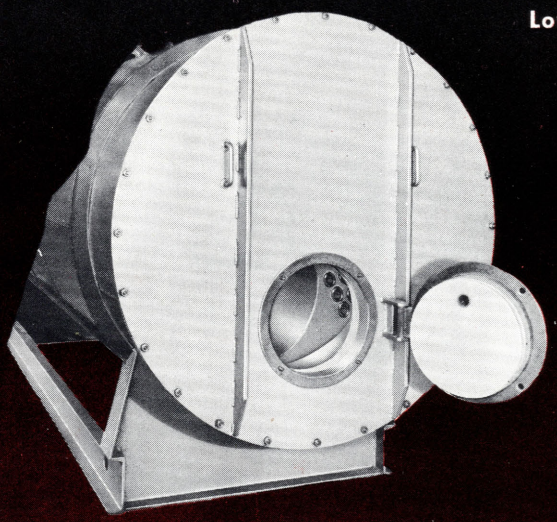
WORKHORSE heating surface . . . maximum efficiency

With much more heating surface than most packaged boilers, the Eclipse Super-Matic produces rated h.p. quickly and efficiently under normal operating conditions. Spreads steam formation more evenly. Small 1½" or 2" diameter tubes provide maximum heat conduction and convection. Boiler lasts a life-time without costly maintenance.

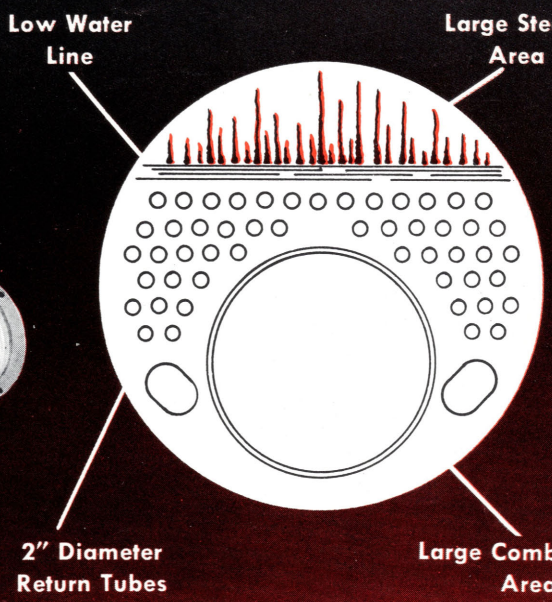
Run-of-the-mill steam generator, with small boiler drum and less heating surface, produces rated h.p. under *ideal* operating conditions only. Construction requires additional tubes *below the furnace*, in violation of fundamental principles of Scotch-Marine boiler design.

Super-Matic, with liberal heating surface, produces rated capacity without strain under *normal* operating conditions.

ECLIPSE SIMPLIFIED FIRE-TUBE CONSTRUCTION GIVES YOU LONG LIFE, ACCESSIBILITY, ECONOMICAL STEAM



Furnace Quickly Accessible for Inspection



Here's why your Boiler worries are over when you install an Eclipse Super-Matic

SELF-CONTAINED—Complete Steamboiler-plant, with all necessary gas or oil valves, controls and boiler trim. Ready for steaming as soon as electricity, steam, water, and fuel lines are connected. Nothing else to buy.

AUTOMATIC FIRING CYCLE — Automatic Control minimizes human supervision. High voltage spark ignites gas pilot and burner. Full fire is maintained until desired pressure is reached—then burner resumes low stage firing or is turned off. Complete and safe combustion is maintained over entire firing cycle. Automatic shut-off for flame failure or low water.

COMPACT, SIMPLE DESIGN — Simple and easy to understand. Fire tubes run the length of the shell at the side and above the internal furnace. Gases from the furnace reverse direction in the chamber at the rear, traveling forward through the tubes. "Better than code" in all construction features. Minimum head-room required.

EASY TO CLEAN AND KEEP CLEAN—Impurities in feed-water are settled in sludge area so they can't be baked on to heating surfaces or circulated through the boiler. Water and furnace sides of boiler readily accessible for clean-out and inspection.

COMPLETE AND SAFE COMBUSTION—Maintains correct fuel proportioning through entire range of firing cycle. Combustion space 300% greater than other boilers. Equally efficient with gas, oil, or combination firing. Turbulent flue gas flow provides maximum heat transfer.

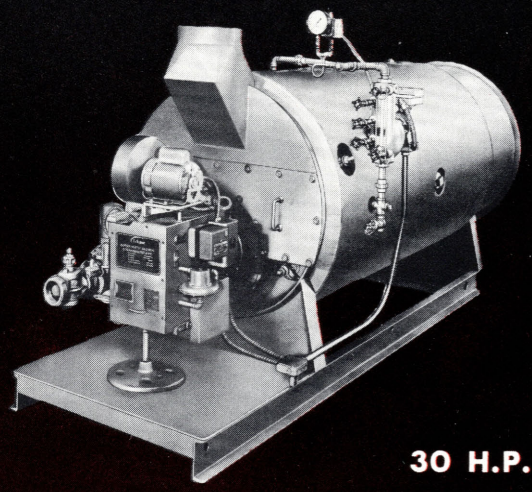
SAFE OPERATING—Liberal heating surface for each h.p. rating. Heavy-duty shell construction. Large handholes provided for cleaning. Equipped with all necessary safety valves, water gauges, and other boiler trim.

LARGE STEAM SPACE—Large storage volume prevents fluctuations in water level or steam pressure. Constant horsepower output easily maintained—load changes are quickly met.

LARGE HEATING SURFACE—Greater heating surface squeezes every bit of heat from the flue gases. Greater steam liberation area provides drier steam and eliminates foaming and priming. Water line easily maintained.

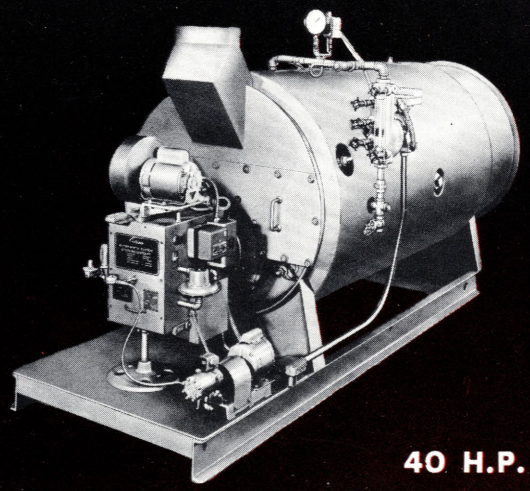
BURNS GAS, OIL OR BOTH . . . WITH EQUAL STEAMING EFFICIENCY

12 TO 125 H.P. . . . FOR EVERY PROCESS STEAM REQUIREMENT



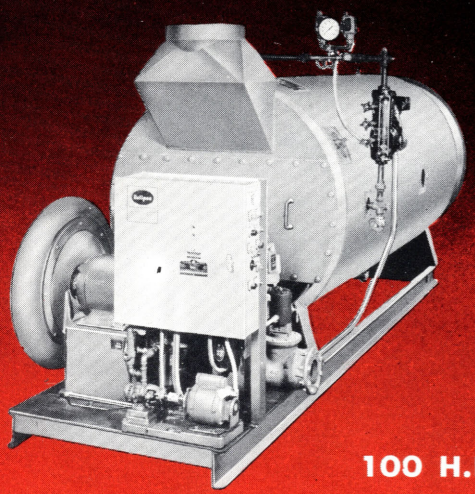
30 H.P.

Series SP-G Eclipse Gas-Fired Super-Matic
U.L. Listed



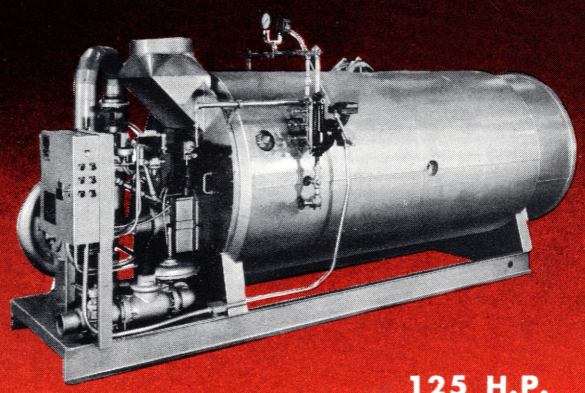
40 H.P.

Series SP-O Eclipse Oil-Fired Super-Matic
U.L. Listed



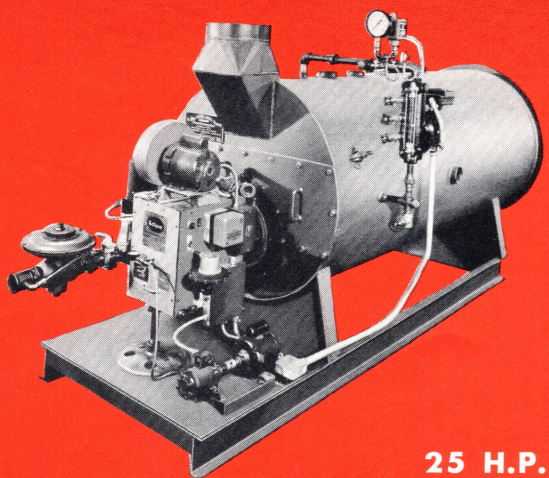
100 H.P.

Series ST-CGO-L Eclipse Combination Gas/Oil
Fired Super-Matic with Electric Gas Ignition



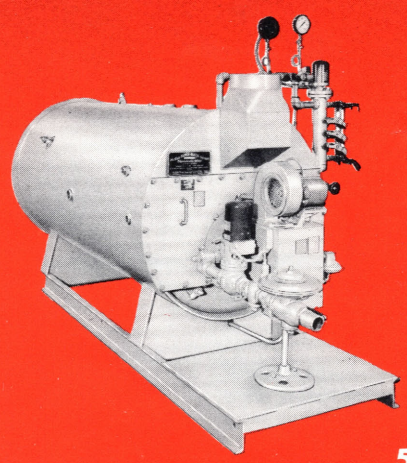
125 H.P.

Eclipse Series PBE Gas-Fired Super-Matic



25 H.P.

Series SP-CGO Eclipse Combination Gas/Oil
Fired Super-Matic U.L. Listed



50 H.P.

Eclipse Series SP-O Oil-Fired Super-Matic
for 350 lb. W.P., U.L. Listed

FULLY AUTOMATIC CONTROL

Boiler controls furnished to meet exact operating requirements. Correct design prevents over-firing, saves fuel and provides maximum safety during start of burner. All electrical controls are standard components, assembled and wired into enclosed panels. For any starting and stopping circuit, with *full-on—full-off* or *hi-low-off* firing cycles.

SPECIFICATIONS—BOILER EQUIPMENT

Each Eclipse Super-Matic includes boiler shell mounted on rigid steel platform, flue gas collector, burner, air blower with direct-connected motor, motorized gas valve and/or oil solenoid valve, air and fuel ratio adjuster, gas pressure regulator or zero gas governor, gas cock, gas pilot with solenoid valve and spark igniter, ignition transformer, low water fuel cut-off with water level control switch, electronic flame failure protection, pressure switch, water column, pop safety valve, steam gauge, try cocks and water gauge. Design and construction equals or exceeds all latest requirements of A.S.M.E. Code. Every "Steamboilerplant" shipped completely assembled, ready for immediate, efficient operation as soon as electricity, steam, water, fuel and stack are connected. All necessary wiring is complete—installer just ties electricity into terminal box. No stack draft required—simply have a chimney high enough to discharge flue products to safe point above nearby structures.

BURNER EQUIPMENT

FOR GAS ONLY

FROM 12 THROUGH 60 H.P.—ECLIPSE SERIES G AND SP-G (SERIES SP-G U.L. LISTED)

The Eclipse Series G Super-Matic is made in five sizes — 12, 15, 20, 25 and 30 H.P., and Series SP-G is made in eight sizes — 12, 15, 20, 25, 30, 40, 50 and 60 H.P. and has more efficient burner than Series G; burn gas* only. Burner has *full-on, full-off* cycle. To start operation current is turned on actuating spark ignition and gas pilot valve. Pilot flame contacts flame rod, energizing electronic safety device. This opens main gas valve, and puts "Steamboilerplant" in full automatic operation.

Pilot burns continuously while main burner is on, but ignition cuts off. When desired steam pressure is reached, pressure switch shuts off burner and pilot, and "Steamboilerplant" is ready for next demand for gas. Gas and air are mixed at point of combustion. Burner produces soft, blue flame, and operates smoothly and quietly. Control circuit requires 110 volt, 1 phase, 60 cycle, and blower requires either 110 volt, 1 phase, 60 cycle or polyphase current. Gas pressure regulator to reduce inlet pressure to required burner pressure is included with "Steamboilerplant."

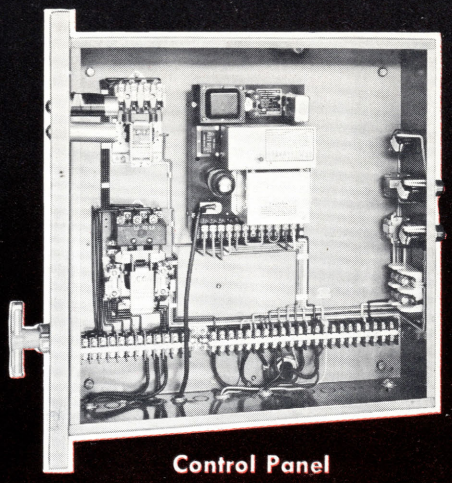
FROM 80 THROUGH 125 H.P.—ECLIPSE SERIES PBE

Made in three sizes — 80, 100 and 125 H.P., for gas* fuels only. When *start* switch is actuated, burner goes through initial purge period, *after* which ignition and gas pilot valve come on. Pilot flame contacts flame rod, energizing electronic circuit and opening main gas valve. This starts burner in *low fire,* after which it progresses slowly to *high fire.* Gas pilot cuts off after main burner is ignited. When steam reaches desired pressure, burner gradually reverts to *low fire.* It remains at *low fire* unless steam demand is unusually low. If demand is low, boiler pressure rises and main burner and blower cut off. As steam pressure drops, electronic instrument starts blower for purge and repeats above cycle.

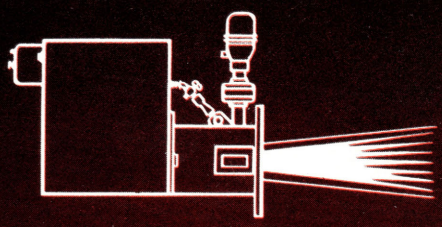
Combustion air, supplied by Eclipse Centrifugal Pressure Blower, flows through air jet located in suction tee. Resulting suction entrains gas, which has been reduced by governor to zero pressure. Volume of air flowing through jet controls amount of gas burned. Perfect proportioning of gas and air is maintained over entire firing range. Burner produces a short, clean flame in combustion tuyere.

All wiring is complete. It is necessary only to connect single phase to control circuit terminal in panel and polyphase current to motor circuit terminals, both of which are clearly marked. Control circuit is single phase. Blower motor circuit is polyphase. Gas pressure regulator can be furnished, if desired.

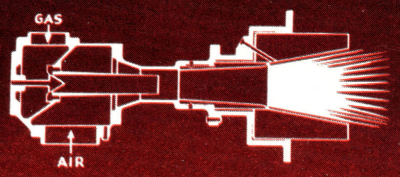
*(manufactured, mixed, natural, or L.P.)(SP-G not furnished for manufactured gas)



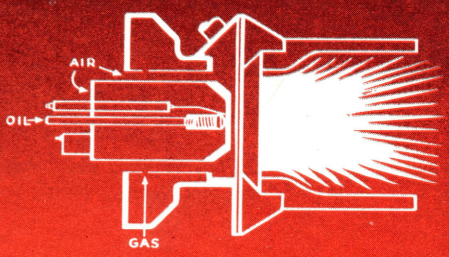
Control Panel



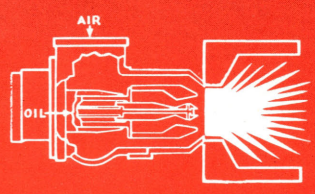
"Gas-Pak" Burner



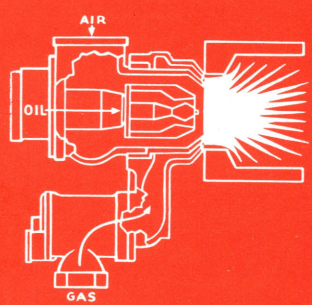
Series "PBE" Burner



Series "SPO and SPCGO" Burner



Series ST-O-L and ST-O-H Burner



Series ST-CGO-L and ST-CGO-H Burner

SPECIFICATIONS

FOR GAS OR LIGHT OIL

12 THROUGH 60 H.P.—ECLIPSE SERIES SP-CGO (U.L. LISTED)

Made in eight sizes — 12, 15, 20, 25, 30, 40, 50 and 60 H.P. Burns light oil (No. 2 A.S.T.M. D396-48T) or gas*. **When burning gas** and current to "Steamboilerplant" is turned on, air blower starts, electric igniter immediately operates and pilot gas valve opens. As pilot flame contacts flame rod, and after air pressure reaches set point, main gas valve opens, putting burner in full operation. Gas pilot continues to burn, but the ignition cuts off. **When burning oil,** the oil is ignited directly (no gas pilot) and photo cell holds burner in. Firing cycle is *full-on, full-off.* When desired steam pressure is reached, electric pressure control switch cuts off blower and main gas or oil valve. As steam pressure drops, burner returns to *full-on* operation. Fuel changeover simply and easily accomplished by snapping burner switch to *gas* or *oil,* whichever is desired, plus simple adjustment of firing head position.

Combustion air is supplied by low pressure squirrel cage blower with direct-connected motor. Air is admitted through a special combustion head, which produces a spiral turbulence for intimate air-gas or air-oil mixing and complete combustion with either fuel.

Control circuit requires 110 volt, 1 phase, 60 cycle, and blower requires either 110 volt, 1 phase, 60 cycle or polyphase current.

80 THROUGH 125 H.P.—ECLIPSE SERIES ST-CGO-L

Made in three sizes — 80, 100 and 125 H.P. Burn No. 1 or 2 fuel oil, or some lighter grades of Nos. 4 and 5 oil without preheating, but any oils having viscosities higher than 85 S.S.U. *at burner* must be preheated. Numbers specified refer to those in A.S.T.M. Spec. D-396-48T. Burner equipment identical with that of the Series ST-O-L (below) except for addition of gas burner nozzle. Snap-switch changes burner quickly and easily to gas or oil. High combustion efficiency is obtained with either fuel!

FOR GAS OR HEAVY OIL

See note under "For Heavy Oil Only"

60 THROUGH 125 H.P.—ECLIPSE SERIES ST-CGO-H

Made in four sizes — 60, 80, 100 and 125 H.P. Burns heavy oils requiring pre-heat, or gas*. Boiler is completely equipped, and has same burner and controls specified under Series ST-O-H (below) with addition of gas burner nozzle. Snap-switch control provides quick, easy changeover to gas or oil.

FOR OIL ONLY

12 THROUGH 60 H.P.—ECLIPSE SERIES SP-O (U.L. LISTED)

Made in eight sizes — 12, 15, 20, 30, 40, 50 and 60 H.P., burns light oil only (No. 2 A.S.T.M. D396-48T). Burner and control equipment are identical with those of the Series SP-CGO (above) without gas attachment.

80 THROUGH 125 H.P.—ECLIPSE SERIES ST-O-L

Made in three sizes — 80, 100 and 125 H.P. (Burn same oil as ST-CGO-L). Multi-position switch permits operation at *low* or *high fire,* or at three intermediate positions. Burner is proportioning type, and proper air-oil ratio consistently maintained at all stages of firing. Burner may be adjusted to achieve complete combustion, with a clean, bright flame. Produces no smoke or soot.

Operation is started by simply turning on the current. Before spark ignition and gas pilot valve operate, blower first purges the "Steamboilerplant." As pilot flame contacts flame rod, main oil valve opens and burner starts firing. Electric eye picks up flame and holds controls in contact. After 20 or 30 seconds, ignition cuts off and pilot gas valve closes so pilot gas required for only a few seconds. Hence, the main burner monitors itself, assuring efficient operation and constant complete combustion. The above lighting sequence is accomplished at *low-fire,* after which burner gradually switches to *high-fire.* When steam pressure reaches desired point, burner automatically switches to *low-fire,* and if pressure continues to rise, burner cuts off completely, along with blower motor. The "Steamboilerplant" is then ready for next ignition cycle.

Boiler equipment includes Eclipse Centrifugal Pressure Blower, electric burner lever operator, oil solenoid valve, oil pump, electronic flame failure protection, electric eye for viewing flame, and a specially wired control panel. All wiring is complete. It is necessary only to connect single phase to control circuit terminal in panel and polyphase current to motor circuit terminals, both of which are clearly marked. Control circuit is for single phase A.C. Blower motor operates on polyphase A.C.

FOR HEAVY OIL ONLY

60 THROUGH 125 H.P. — ECLIPSE SERIES ST-O-H

Made in four sizes—60, 80, 100 and 125 h.p., and burns heavy oil, such as Bunker C, and others requiring pre-heat. (Pre-heating is required for any oil having viscosity greater than 85 seconds Saybolt Universal at burner.) Burner and operating sequence are same as Series ST-O-L (above) with addition of electric oil pre-heating system. Units for burning oils requiring heating are not recommended unless ample, expert maintenance personnel is on duty at all times. Heavy oils are difficult to ignite after overnight shutdown. Oil at the proper temperature must be at burner head itself before attempt to ignite is made. Where oil fuel must be used, we recommend light oil. Full operating instructions furnished with each Boiler.

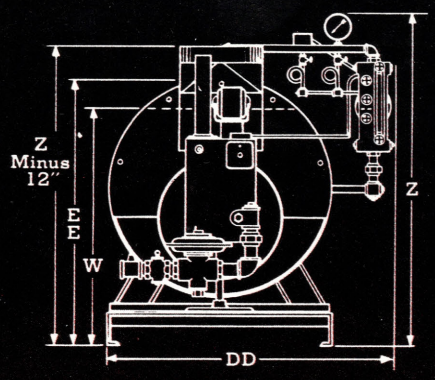
*(manufactured, mixed, natural, or L.P.) (SP-CGO not furnished for manufactured gas).

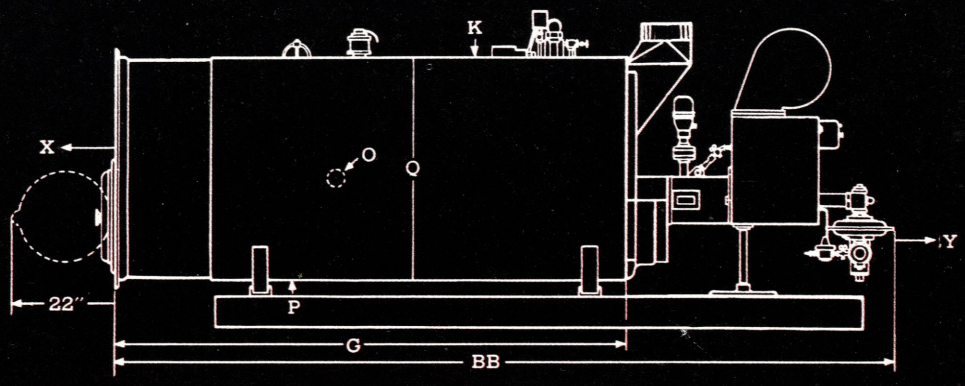
MINIMUM GAS PRESSURES REQUIRED

	550 BTU	800 BTU	1000 BTU	LP Gas
Series G	4″	5″	6″	6″
PBE	4″	5″	6″	6″
ST-CGO-L	4″	5″	6″	6″
ST-CGO-H	4″	5″	6″	6″
SP-G and SP-CGO, 12 through 20 H.P.	Not	4″	4″	6″
25 and 30 HP	Available	5″	4″	6″
40 HP	For	7″	6″	6″
50 and 60 HP	Mfg. Gas	6″	6″	6″

BTU value and inlet gas pressure *must* be specified when ordering.

DIMENSIONS AND SPECIFICATIONS





CURRENT DIMENSIONS AND SPECIFICATIONS
ECLIPSE SUPER-MATIC SCOTCH STEAMBOILER PLANTS

MAXIMUM HP RATING	12	15	20	25	30	40***	50***	60***	80††	100††	125††
Hourly Output in Lbs. of Steam†††	414	517.5	690	862.5	1035	1380	1725	2070	2760	3450	4312.5
Maximum Input for Figuring Gas Pipe Size (Actual input considerably less)	600,000	750,000	1,000,000	1,250,000	1,500,000	2,000,000	2,500,000	3,000,000	4,000,000	5,000 000	6,250,000
Z Approx. Overall Height	60"	60"	60"	60"	65"	65"	67½"	67½"	73¾"	73¾"	81¼"
Approx. Overall Height** (See Note Below)	50½"	50½"	50½"	50½"	55½"	55½"	64¾"	64¾"	73¼"	73¼"	78¼"
BB Approx. Overall Length	112"	127"	143"	165"	150"	150"	160"	166"	160"	186"	201"
Approx. Overall Length** (See Note Below)	103"	118"	134"	156"	141"	141"	151"	157"	151"	177"	192"
DD Approx. Overall Width	44"	44"	44"	44"	50"	50"	56"	56"	62"	62"	68"
Approx. Overall Width** (See Note Below)	34½"	34½"	34½"	34½"	40½"	40½"	46¼"	46¼"	52¾"	52¾"	58¾"
Q Dia. Boiler Shell	30"	30"	30"	30"	36"	36"	41½"	41½"	48"	48"	54"
G Length Boiler Shell*	72"	87"	102"	120"	107"	107"	107½"	127½"	119½"	137½"	144½"
Y Space Req'd for Tube Removal (Front) †	15"	30"	45"	62"	51"	51"	45"	65"	45"	63"	69"
X Space Req'd for Tube Removal (Rear) †	33"	48"	63"	81"	67"	67"	55"	75"	67"	85"	91"
Blower Motor Horsepower											
G	⅓	⅓	⅓	½	½						
SPO-SPG, SP-CGO	⅓	⅓	⅓	⅓	½	¾	1	1			
PBE									3	5	7½
ST-O-L & ST-CGO-L									3	7½	7½
ST-O-H & ST-CGO-H								5	7½	7½	10
EE Approx. Hgt. to Steam Outlet	43"	43"	43"	43"	49"	49"	54½"	54½"	61"	61"	69"
W Approx. Hgt. Nor. Water Level	38½"	38½"	38½"	38½"	43¼"	43¼"	45¾"	45¾"	52"	52"	55¼"
K Size Steam Outlet	One 2"	One 2"	One 2"	Two 2"	Two 2"	Two 2"	Two 3"	Two 3"	Two 3"	Two 3"	Two 3"
O Size Water Inlet	Two 1¼"	Two 1¼"	Two 1¼"	Two 1¼"	Two 1¼"	Two 1¼"	Two 1½"	Two 1½"	Two 1½"	Two 1½"	Two 1½"
P Size Blowoff Opening	1"	1"	1"	1¼"	1¼"	1¼"	1¼"	1½"	1½"	1½"	1½"
Size Gas Connection Manufactured	1½"****	2"	2"	2"	2"	3"	4"	4"	4"	4"	4"
Size Gas Connection Mixed	1½"****	1½"****	2"	2"	2"	2"	3"	3"	4"	4"	4"
Size Gas Connection Natural	1½"****	1½"****	2"	2"	2"	2"	2"	3"	3"	3"	3"
Size Gas Connection L.P.	1½"****	1½"****	2"	2"	2"	2"	2"	3"	2½"	3"	3"
Size Flue Connection	8" O.D.	8" O.D.	8" O.D.	8" O.D.	10" O.D.	10" O.D.	12" O.D.	12" O.D.	16" O.D.	16" O.D.	18" O.D.
Approx. Water Cap. to Nor. Level (Gals.)	92	120	147	185	210	210	250	320	365	437	560
Estimated approx. Shipping Wgt.-(125# W.P.)	2850#	2950#	3250#	3600#	4350#	4375#	5400#	6600#	8250#	9125#	10,525#
Wgt. incl. Water	3615#	3950#	4475#	5140#	6100#	6125#	7480#	9270#	11,290#	12,765#	15,200#
Hgt. to Top of Flue Connection	48¾"	48¾"	48¾"	48¾"	54½"	54½"	64¾"	64¾"	73½"	73¼"	78¼"

* Including Smoke box

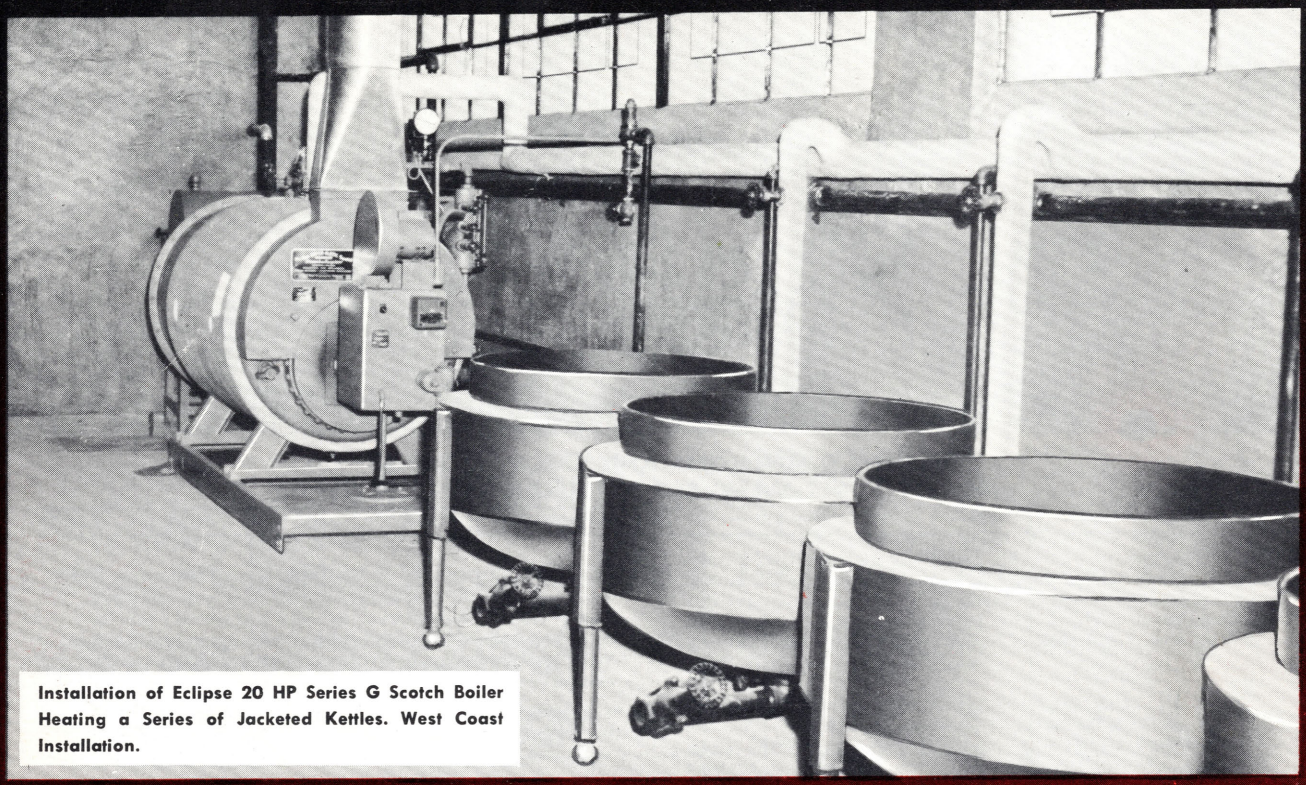
** In some cases difficulty may be encountered in getting boiler to point of installation, because of physical dimensions of assembled boiler. In such cases it is possible to easily remove trim and some miscellaneous parts, which reduces dimensions to those indicated by asterisks.

*** These sizes carry Catalog Nos. SP-O-4, SP-CGO-4 and SPG-4. ††These sizes carry catalog Nos. ST-OL-4, ST-CGO-L-4, ST-OH-4 and ST-CGO-H-4.

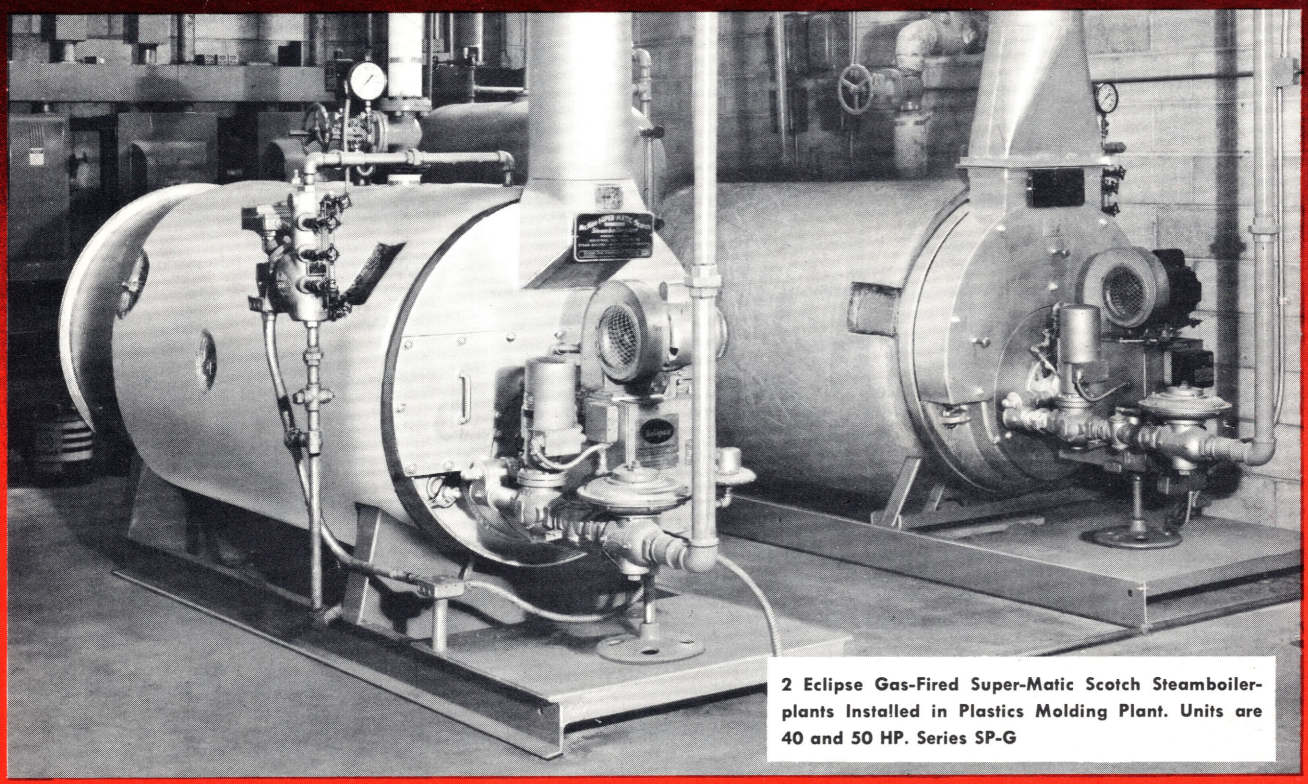
**** On SP-G and SP-CGO these sizes are 2". ††† Up to 2000 feet elevation except ratings of ST-OH and ST-CGO-H units are based on elevations of 1000 feet or less.

† Add one of these dimensions to overall length to allow for tube removal. Shipping weights are not guaranteed.

INSTALLATIONS OF ECLIPSE SUPERMATIC SCOTCH "STEAMBOILERPLANTS"

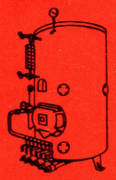


Installation of Eclipse 20 HP Series G Scotch Boiler Heating a Series of Jacketed Kettles. West Coast Installation.

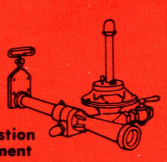


2 Eclipse Gas-Fired Super-Matic Scotch Steamboiler-plants Installed in Plastics Molding Plant. Units are 40 and 50 HP. Series SP-G

Eclipse®

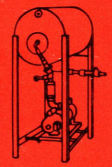


Dowtherm Vaporizers



Combustion Equipment

Small Vertical Boilers



Condensate Systems

ECLIPSE FUEL ENGINEERING CO., ROCKFORD, ILLINOIS, U. S. A.

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